

PATENT

Application # 09/851,283

Attorney Docket # 1999-0647A (1014-132)

AMENDMENTS

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AMENDMENTS TO THE CLAIMS

1. (Currently Amended) An apparatus adapted for managing data flow in a router in a network, comprising:

a memory adapted for storing an eligibility marker, ~~the eligibility marker~~, wherein the eligibility marker is indicative that a data packet of a plurality of data packets is eligible for overflow routing based upon a network policy and at least one of a source port ID, a source IP address, and an intended packet destination address, wherein not all data packets from the plurality of data packets are eligible for overflow routing; and

a switch adapted for switching, upon detection of congestion on one of the output ports and detection of the eligibility marker, ~~for outputting the eligible data packet of the plurality of data packets from a primary output path of the one of the output ports corresponding to a destination address of the eligible data to be output packet~~, to an overflow path for the destination address of the eligible data packet, said switch operated based upon congestion occurring only within the router.

2. (Currently Amended) The apparatus according to claim 1, further comprising:

a congestion detector adapted for detecting when the congestion has abated;

~~said wherein said switch is adapted for further switching the output of data packets corresponding to the destination address of the eligible data packet~~ from the overflow path back to the primary output path corresponding to ~~for~~ the destination address.

3. (Currently Amended) The apparatus according to claim 1, further comprising:

a memory adapted for storing a forwarding table in the router, the forwarding table having

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entries respectively corresponding to destination addresses in the network and identifying at least two output paths from the router for at least someone of the destination addresses to enable overflow routing, one of the at least two output paths being identified as a corresponding primary path and other of the at least two output paths being identified as overflow paths.

4. (Currently Amended) The apparatus according to claim 3, further comprising:

a processor adapted for determining, upon detection of congestion on the one of the output ports, on which one of the at least two overflow paths from which to output switch the eligible data packet based upon an amount of data packets currently assigned to be output from on each of the at least two overflow paths.

5. (Currently Amended) The apparatus according to claim 4, wherein the processor is adapted for:

_____ further determining the an amount of data packets currently assigned to be output on from each of the overflow at least two output paths;

determining which one of the at least two a selected overflow path from the overflow paths, the selected overflow path assigned a has the least amount of the amount of data packets currently assigned to be output on each of the overflow paths; and

assigning the eligible data packet to be output from the at least one of the selected overflow paths having the least amount of data to be output path.

6. (Currently Amended) An apparatus adapted for managing data flow in a router in a network, wherein the router includes a forwarding table having entries respectively corresponding to destination addresses in the network and identifying at least two a plurality of output paths from the router for at least someone of the destination addresses to enable overflow routing, one of the at least two plurality of output paths being identified as a primary path and other

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~~each remaining output path of the plurality of output paths being identified as an overflow~~
paths, the apparatus comprising:

a congestion monitor adapted for monitoring receipt of a congestion signal indicative of congestion signals from at least two transmit buffers respectively associated with at least two an output ~~ports~~ port of the router;

a memory adapted for storing an eligibility marker, the eligibility marker based upon a network policy and at least one of a source port ID, a source IP address, and an intended destination address, wherein the eligibility marker identifies destination addresses that are eligible for overflow routing, wherein not all destination addresses are eligible for overflow routing; and

a switch adapted for switching, for all ~~of the~~ destination addresses in the forwarding table affected by the detection of congestion and eligible for overflow routing, ~~for switching from the primary path to a selected one of the plurality of overflow paths for transmitting the data, said switch operated based upon congestion occurring only within the router.~~

7. (Currently Amended) The apparatus according to claim 6, further comprising a processor adapted for determining when the congestion has abated based upon status of the congestion signals; said switch switching, for all ~~of the~~ destination addresses in the forwarding table switched to overflow routing, from the selected overflow path back to the primary path when the congestion has abated.

8. (Currently Amended) An apparatus adapted for managing data flow in a router in a network, comprising:

a memory adapted for storing a forwarding table in the router, the forwarding table having entries respectively corresponding to destination addresses in the network and identifying a plurality of at least two output paths from the router for at least ~~someone~~ of the destination address to enable overflow routing, one of the plurality of at least two output paths being

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identified as a primary path and each remaining output path of the plurality of any other output path-paths being identified as an overflow path;

a memory adapted for storing an eligibility marker, the eligibility marker based upon a network policy and at least one of a source port ID, a source IP address, and a packet destination address, wherein the eligibility marker identifies destination addresses that are eligible for overflow routing, wherein not all destination addresses are eligible for overflow routing;

a congestion monitor adapted for monitoring receipt of congestion signals indicative of congestion from at least two transmit buffers respectively associated with at least two an output ports-port of the router; and

a switch adapted for switching data packets associated with the determined destination address, for all of the destination addresses in the forwarding table affected by the detection of congestion and eligible for overflow routing, from the primary path to the a selected overflow path for transmitting the data, said switch operated based upon congestion occurring only within the router.

9. (Currently Amended) The apparatus according to claim 8, further comprising:

a processor adapted for determining when the congestion occurring within the router has abated based upon status of the congestion signals and

said switch adapted for switching data packets associated with the determined destination address, for all of the destination addresses in the forwarding table switched to overflow routing, from the selected overflow path back to the primary path when the congestion occurring within the router has abated.

10. (Currently Amended) A router, comprising:

at least one input port;

at least one output port;

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a memory adapted for storing a forwarding table, the forwarding table adapted for having comprising entries an entry respectively corresponding to one of a plurality of destination addresses in the network, the entry and adapted for identifying at least two a plurality of output paths from the router for at least some of the destination addresses to enable overflow routing, one of the plurality of at least two output paths being identified as a primary path and each remaining output path of the any other output path paths being identified as an overflow path, said memory adapted for storing an eligibility marker based upon a network policy and at least one of a source port ID, a source IP address, and an intended destination address, wherein the eligibility marker identifies at least one destination address from the plurality of destination addresses that are eligible for overflow routing, wherein not all of the plurality of destination addresses are eligible for overflow routing; and

a controller adapted for detecting that detects a packet destination address addresses for comprised in data packets to be output from the router, the controller adapted for monitors monitoring congestion status of the at least one output port, and the controller adapted for controlling controls the output of the data packets from the at least one output port based upon the packet destination address addresses comprised in for the data packets, the eligibility marker, and congestion status of the router; and

a switch adapted for switching, responsive to detected congestion, eligible data packets associated with an eligible destination address from the primary output path to a selected overflow path, said switching based upon congestion occurring only within the router.

11. (Currently Amended) The router according to claim 10, wherein the controller ~~switches, upon detection of congestion on the at least one output port, output of the data from a primary output path corresponding to the destination address of the data, to an overflow path for the destination address~~ comprises the switch.

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12. (Currently Amended) The router according to claim 10, wherein the controller is adapted for detects ~~detecting~~ when the congestion occurring only within the router has abated, and wherein the controller is adapted for switching ~~switches the output of the data packets comprising the eligible destination address~~ from the selected overflow path back to the primary path ~~for the destination address~~.
13. (Currently Amended) The router according to claim 10, wherein the ~~overflow~~ eligibility marker is adapted for supplying ~~supplies~~ identification information to the controller, and wherein the controller is adapted for storing ~~stores~~ the identification information in the ~~appropriate entries of the forwarding table based upon the destination addresses~~.
14. (Currently Amended) The router according to claim 13, further comprising:
an overflow route calculator adapted for determining ~~that determines the at least one overflow path for each of the destination addresses identified by the overflow eligibility marker~~ the selected overflow path.
15. (Currently Amended) The router according to claim 14, further comprising:
an overflow route populator adapted for populating ~~that populates the forwarding table under control of the controller~~.
16. (Currently Amended) A router comprising:
at least one input port;
at least one output port;
first means for storing a forwarding table, the forwarding table adapted to comprise having ~~entries respectively corresponding an entry for a to destination address from a plurality of~~ destination addresses in the network and identifying ~~at least two a~~ a plurality of output paths from

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the router for ~~at least some of the~~ destination addresses to enable overflow routing, one of the ~~at least two plurality of~~ output paths being identified as a primary path and each remaining output path of the plurality of any other output path-paths being identified as an overflow path; ~~and~~

second means for identifying ~~the a packet destination addresses-address~~ that ~~are-is~~ eligible for overflow routing based upon a network policy and at least one of a source port ID, a source IP address, and ~~a-an intended~~ destination address, wherein not all ~~of the plurality of~~ destination addresses are eligible for overflow routing, storing the ~~identification information-identified packet destination address~~ in the ~~appropriate entries of the forwarding table based upon the destination addresses~~, determining the ~~at least one a selected~~ overflow path for each of the destination ~~addresses-address~~ identified as being eligible for overflow routing, and storing, in the forwarding table, information for the ~~at least one selected~~ overflow path for each of the ~~destination addresses~~ eligible for overflow routing; ~~and~~

a switch adapted for switching, responsive to detected congestion, for the destination address, from the primary path to the selected overflow path, said switch operated based upon congestion occurring only within the router.

17. (Currently Amended) The router according to claim 16, wherein the second means is arranged to;

detect a-the packet destination address for data to be output from the router;
monitor congestion status of the at least one output port; and
control the-an output of the data from the at least one output port based upon the packet destination address for the data-address, the information in the forwarding table corresponding to the packet destination-address-address; and congestion status of the router.

18. (Currently Amended) An apparatus adapted for managing data flow in a network, comprising:

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at least one input port;

at least one output port;

a memory adapted for storing a forwarding table, the forwarding table adapted to
~~comprise an having entries respectively corresponding to entry for a destination address from a~~
plurality of destination addresses in the network and identifying at least two a plurality of
 output paths from the apparatus for at least some of the destination addresses to enable overflow
 routing, one of the ~~at least two~~ plurality of output paths being identified as a primary path and
~~each remaining output path of the any other plurality of output path-paths~~ being identified as an
 overflow path, said memory adapted for storing an eligibility marker, the eligibility marker based
 upon a network policy and at least one of a source port ID, a source IP address, and an intended
 destination address, wherein the eligibility marker identifies a destination addressee that are is
 eligible for overflow routing, wherein not all of the plurality of destination addresses are eligible
 for overflow routing; and

a controller adapted for detecting that detects a packet destination address for comprised
in a data packet to be output from the apparatus, the controller adapted for monitoring monitors
 congestion status of the at least one output port, and the controller adapted for controlling
~~controls the output of the data packet from the at least one output port based upon the~~
~~destination address-address comprised in for the data packet,~~ the eligibility marker, and
 congestion status of the apparatus; and

a switch adapted for switching, responsive to detected congestion, the eligible data packet
associated with an eligible destination address from the primary output path to a selected
overflow path, said switching based upon congestion occurring only within the router.

19. (Currently Amended) An apparatus adapted for managing data flow in a router in a network,
 comprising:

~~a congestion monitor for monitoring congestion status on each output port of the router,~~

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wherein the congestion status is one of a plurality of levels of congestion;

a congestion detector adapted for detecting a level of congestion from the plurality of ~~levels of a predetermined level~~ of congestion on at least one output port of the router;

a memory adapted for storing an eligibility marker based upon a network policy and at least one of a source port ID, a source IP address, and ~~a~~ an intended destination address, wherein the eligibility marker identifies ~~a~~ destination addresses that ~~are~~ is eligible for overflow routing, wherein not all of a plurality of destination addresses in the network are eligible for overflow routing; and

a processor adapted for determining an amount of data to be overflowed based upon the predetermined level of congestion and for switching, upon detection of ~~the one of the plurality of levels of the predetermined level of~~ congestion on the at least one output port and the eligibility marker, the amount of data to be overflowed from a primary output path ~~of the at least one output port corresponding to a destination address of the data to be output, to an overflow path for the eligible destination address, the switching based upon congestion occurring only within the router.~~

20. (Currently Amended) The apparatus according to claim 19, said congestion detector adapted for ~~further detecting when the level of congestion occurring only within the router has abated;~~ and said processor adapted for switching ~~the output of the at least one output port data packets comprising the eligible address from the overflow path back to the primary path for the destination address.~~

21. (Currently Amended) The apparatus according to claim 20, further comprising a memory adapted for storing a forwarding table in the router, the forwarding table having entries adapted to comprise an entry respectively corresponding to for a destination address from a plurality of destination addresses in the network and identifying at least two a plurality of

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output paths from the router for ~~at least some of the~~ destination addresses to enable overflow
routing ~~and for storing, for each of the at least some of the~~ destination addresses, a plurality
of overflow data amounts ~~respectively corresponding to the plurality of levels of congestion.~~

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